1. (a) Peter can mow the lawn in 40 minutes and John can mow the lawn in 60 minutes. How long will it take for them to mow the lawn together?

   In one minute Peter completes ..... the lawn.

   John completes ..... the lawn in one minute.

   Together, in one minute, Peter and John complete ..... the lawn.

   It will take them ..... minute to mow the lawn.

   (b) Jane, Paul and Peter can finish painting the fence in 2 hours. If Jane does the job alone she can finish it in 5 hours. If Paul does the job alone he can finish it in 6 hours. How long will it take for Peter to finish the job alone?

   $x =$ time taken by Peter.

   We have $\frac{1}{5} + \frac{1}{6} +$ ..... $= \frac{1}{2}$.

   Solve this equation, we get $x =$ .....

   (c) A tank can be filled by pipe A in 3 hours and by pipe B in 5 hours. When the tank is full, it can be drained by pipe C in 4 hours. If the tank is initially empty and all three pipes are open, how many hours will it take to fill up the tank?

   $x =$ time taken to fill up the tank.

   We have $\frac{1}{3} + \frac{1}{5} +$ ..... = ...

   Then, $x =$ .....

2. (a) Jack can paint a wall in 3 hours. John can do the same job in 5 hours. How long will it take if they work together?

   (b) Working, independently X takes 12 hours to finish a certain work. He finishes 2/3 of the work. The rest of the work is finished by Y whose rate is 1/10 of X. In how much time does Y finish his work?

   (c) Working together, printer A and printer B would finish a task in 24 minutes. Printer A alone would finish the task in 60 minutes. How many pages does the task contain if printer B prints 5 pages a minute more than printer A?

3. (a) Tom, working alone, can paint a room in 6 hours. Peter and John, working independently, can paint the same room in 3 hours and 2 hours, respectively. Tom starts painting the room and works on his own for one hour. He is then joined by Peter and they work together for an hour. Finally, John joins them and the three of them work together to finish the room, each one working at his respective rate. What fraction of the whole job was done by Peter?

   (b) Machines each working at the same constant rate together can complete a job in 12 days. How many additional machines, each working at the same constant rate, will be needed to complete the job in 8 days?

   (c) John can complete a given task in 20 days. Jane will take only 12 days to complete the same task. John and Jane set out to complete the task by beginning to work together. However, Jane was indisposed 4 days before the work got over. In how many days did the work get over from the time John and Jane started to work on it together?

   (d) 25 men reap a field in 20 days. When should 15 men leave the work, if the whole field is to be reaped in 37.5 days after they leave the work?

1. Working alone, Ryan can dig a 10 ft by 10 ft hole in five hours. Castel can dig the same hole in six hours. How long would it take them if they worked together?

2. Shawna can pour a large concrete driveway in six hours. Dan can pour the same driveway in seven hours. Find how long it would take them if they worked together.

3. It takes Trevon ten hours to clean an attic. Cody can clean the same attic in seven hours. Find how long it would take them if they worked together.

4. Working alone, Carlos can oil the lanes in a bowling alley in five hours. Jenny can oil the same lanes in nine hours. If they worked together how long would it take them?

5. Working together, Paul and Daniel can pick forty bushels of apples in 4.95 hours. Had he done it alone it would have taken Daniel 9 hours. Find how long it would take Paul to do it alone.

6. Working together, Jenny and Natalie can mop a warehouse in 5.14 hours. Had she done it alone it would have taken Natalie 12 hours. How long would it take Jenny to do it alone?

7. Rob can tar a roof in nine hours. One day his friend Kayla helped him and it only took 4.74 hours. How long would it take Kayla to do it alone?

8. Working alone, it takes Kristin 11 hours to harvest a field. Kayla can harvest the same field in 16 hours. Find how long it would take them if they worked together.

9. Krystal can wax a floor in 16 minutes. One day her friend Perry helped her and it only took 5.76 minutes. How long would it take Perry to do it alone?

10. Working alone, Dan can sweep a porch in 15 minutes. Alberto can sweep the same porch in 11 minutes. If they worked together how long would it take them?

11. Ryan can paint a fence in ten hours. Asanji can paint the same fence in eight hours. If they worked together how long would it take them?

12. Working alone, it takes Asanji eight hours to dig a 10 ft by 10 ft hole. Brenda can dig the same hole in nine hours. How long would it take them if they worked together?

1. To qualify for a race, you need to average 60 mph driving two laps around a 1-mile long track. You have some sort of engine difficulty the first lap so that you only average 45 mph during that lap; how fast do you have to drive the second lap to average 60 for both of them?

	distance	average speed	time
lap 1			
lap 2		x	
total			

2. An executive drove from home at an average speed of 30 mph to an airport where a helicopter was waiting. The executive boarded the helicopter and flew to the corporate offices at an average speed of 60 mph. The entire distance was 150 miles; the entire trip took three hours. Find the distance from the airport to the corporate offices.

	distance	speed	time
driving			
flying	x		
total			

3. A passenger train leaves the train depot 2 hours after a freight train left the same depot. The freight train is traveling 20 mph slower than the passenger train. Find the speed of the passenger train, if it overtakes the freight train in three hours.

	distance	speed	time
passenger train		x	
freight train			
total			

4. Two cyclists start at the same time from opposite ends of a course that is 45 miles long. One cyclist is riding at 14 mph and the second cyclist is riding at 16 mph. How long after they begin will they meet?

	distance	speed	time
cyclist 1			t
cyclist 2			t
total			

5. A boat travels for three hours with a current of 3 mph and then returns the same distance against the current in four hours. What is the boat's speed in calm water?

   Notice: speed of the current is 3 mph.

   b = the boat's speed in calm water.

	distance	speed	time
downstream			
upstream			
total			

1. Jose left the airport and traveled toward the mountains. Kayla left 2.1 hours later traveling 35 mph faster in an effort to catch up to him. After 1.2 hours Kayla finally caught up. Find Jose's average speed.

2. Chelsea left the White House and traveled toward the capital at an average speed of 34 km/h. Jasmine left at the same time and traveled in the opposite direction with an average speed of 65 km/h. Find the number of hours Jasmine needs to travel before they are 59.4 km apart.

3. A submarine left Hawaii two hours before an aircraft carrier. The vessels traveled in opposite directions. The aircraft carrier traveled at 25 mph for nine hours. After this time the vessels were 280 mi. apart. Find the submarine's speed.

4. Ryan left the science museum and drove south. Gabriella left three hours later driving 42 km/h faster in an effort to catch up to him. After two hours Gabriella finally caught up. Find Ryan's average speed.

5. Kali left school and traveled toward her friend's house at an average speed of 40 km/h. Matt left one hour later and traveled in the opposite direction with an average speed of 50 km/h. Find the number of hours Matt needs to travel before they are 400 km apart.

6. A cargo plane flew to the maintenance facility and back. It took one hour less time to get there than it did to get back. The average speed on the trip there was 220 mph. The average speed on the way back was 200 mph. How many hours did the trip there take?

7. Jose left the White House and drove toward the recycling plant at an average speed of 40 km/h. Rob left some time later driving in the same direction at an average speed of 48 km/h. After driving for five hours Rob caught up with Jose. How long did Jose drive before Rob caught up?

8. A cattle train left Miami and traveled toward New York. 14 hours later a diesel train left traveling at 45 km/h in an effort to catch up to the cattle train. After traveling for four hours the diesel train finally caught up. What was the cattle train's average speed?

9. A passenger plane made a trip to Las Vegas and back. On the trip there it flew 432 mph and on the return trip it went 480 mph. How long did the trip there take if the return trip took nine hours?

10. An aircraft carrier made a trip to Guam and back. The trip there took three hours and the trip back took four hours. It averaged 6 km/h on the return trip. Find the average speed of the trip there.

1. Running at their respective constant rates, machine X takes 2 days longer to produce x widgets than machine Y. At these rates, if the two machines together produce $\frac{5}{4}x$ widgets in 3 days, how many days would it take machine X alone to produce $2x$ widgets?

   A. 4, B. 6, C. 8, D. 10, E. 12

2. Working together, printer A and printer B would finish the task in 24 minutes. Printer A alone would finish the task in 60 minutes. How many pages does the task contain if printer B prints 5 pages a minute more than printer A?

   A. 600, B. 800, C. 1000, D. 1200, E. 1500

3. When a certain tree was first planted, it was 4 feet tall, and the height of the tree increased by a constant amount each year for the next 6 years. At the end of the 6th year, the tree was 1/5 taller than it was at the end of the 4th year. By how many feet did the height of the tree increase each year?

   A. 3/10, B. 2/5, C. 1/2, D. 2/3, E. 6/5

4. A pool can be filled in 4 hours and drained in 5 hours. The valve that fills the pool was opened at 1:00 pm and some time later the drain that empties the pool was also opened. If the pool was filled by 11:00 pm and not earlier, when was the drain opened?

   A. at 2:00 pm, B. at 2:30 pm, C. at 3:00 pm, D. at 3:30 pm, E. at 4:00 pm

5. With both valves open, the pool will be filled with water in 48 minutes. The first valve alone would fill the pool in 2 hours. What is the capacity of the pool if every minute the second valve admits 50 cubic meters of water more than the first?

   A. 9000 m^3, B. 10500, C. 11750, D. 12000, E. 12500

6. It takes printer A 4 more minutes than printer B to print 40 pages. Working together, the two printers can print 50 pages in 6 minutes. How long will it take printer A to print 80 pages?

   A. 12, B. 18, C. 20, D. 24, E. 30

7. At their respective rates, pump A, B, and C can fulfill an empty tank, or pump-out the full tank in 2, 3, and 6 hours. If A and B are used to pump-out water from the half-full tank, while C is used to fill water into the tank, in how many hours, the tank will be empty?

   A. 2/3, B. 1, C. 3/4, D. 3/2, E. 2

8. Lindsay can paint $\frac{1}{x}$ of a certain room in 20 minutes. What fraction of the same room can Joseph paint in 20 minutes if the two of them can paint the room in an hour, working together at their respective rates?

   A. $\frac{1}{3x}$, B. $\frac{3x}{x-3}$, C. $\frac{x-3}{3x}$, D. $\frac{x}{x-3}$, E. $\frac{x-3}{x}$

9. Machines X and Y run at different constant rates, and machine X can complete a certain job in 9 hours. Machine X worked on the job alone for the first 3 hours and the two machines, working together, then completed the job in 4 more hours. How many hours would it have taken machine Y, working alone, to complete the entire job?

   A. 18, B. $13\frac{1}{2}$, C. $7\frac{1}{5}$, D. $4\frac{1}{2}$, E. $3\frac{2}{3}$

10. Six machines, each working at the same constant rate, together can complete a certain job in 12 days. How many additional machines, each working at the same constant rate, will be needed to complete the job in 8 days?

    A. 2, B. 3, C. 4, D. 6, E. 8

11. Machines A and B are each used to manufacture 660 sprockets. It takes A 10 hours longer to produce 660 sprockets than machine B. B produces 10 percent more sprockets per hour than A. How many sprockets per hours does machine A produce?

    A. 6, B. 6.6, C. 60, D. 100, E 110

12. A company has two types of machines, type R and type S. Operating at a constant rate, a machine of type R does a certain job in 36 hours and a machine of type S does the same job in 18 hours. If the company used the same number of each type of machine to do the job in 2 hours, how many machines of type R were used?

    A. 3, B. 4, C. 6, D. 9, E. 12

13. One hour after Yolanda started walking from X to Y, a distance of 45 miles, Bob started walking along the same road from Y to X. If Yolanda's walking rate was 3 miles/hour and Bob's was 4 miles/hour, how many miles had Bab walked when they met?

    A. 24, B. 23, C. 22, D. 21, E. 19.5

14. Working alone at its own constant rate, a machine seals k cartons in 8 hours, and working alone at its own constant rate, a second machine seals k cartons in 4 hours. If the machines, each working at its own constant rate and for the same period of time, together sealed a certain number of cartons, what percent of the cartons were sealed by the machine working at the faster rate?

    A. 25%, B. $33\frac{1}{3}$%, C. 50%, D. $66\frac{2}{3}$%, E. 75%

15. Matt and Peter can do together a piece of work in 20 days. After they have worked together for 12 days Matt stops and Peter completes the remaining work in 10 days. In how many days Peter complete the work separately?

    A. 26 days, B. 27 days, C. 23 days, D. 25 days, E. 24 days

16. A certain car averages 25 miles per gallon of gasoline when driven in the city and 40 miles per gallon when driven on the highway. According to these rates, which of the following is closest to the number of miles per gallon that the car averages when it is driven 10 miles in the city and then 50 miles on the highway?

    A. 28, B. 30, C. 33, D. 36, E. 38

17. Working together, John and Jack can type 20 pages in one hour. They will be able to type 22 pages in one hour if Jack increases his typing speed by 25%. What is the ratio of Jack's normal typing speed to that of John?

    A. 1/3, B. 2/5, C. 1/2, D. 2/3, E. 3/5

18. One smurf (xì trum) and one elf can build a treehouse together in two hours, but the smurf would need the help of two fairies in order to complete the same job in the same amount of time. If one elf and one fairy worked together, it would take them four hours to build the treehouse. Assuming that work rates for smurfs, elves, and fairies remain constant, how many hours would it take one smurf, one elf, and one fairy, working together, to build the treehouse?

    A. 5/7, B. 1, C. 10/7, D. 12/7, E. 22/7

19. Company S produces two kinds of stereos: basic and deluxe. Of the stereos produced by Company S last month, 2/3 were basic and the rest were deluxe. If it takes 7/5 as many hours to produce a deluxe stereo as it does to produce a basic stereo, then the number of hours it took to produce the deluxe stereos last month was what fraction of the total number of hours it took to produce all the stereos?

    A. 7/17, B. 14/31, C. 7/15, D. 17/35, E. 1/2